1966

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Presented before the University of Georgia Chapter of Beta Alpha Psi—December 1966

WHEN I was a member of Beta Alpha Psi I was a senior in college with one quarter remaining before graduation. At that point in my training, in addition to the two introductory courses, I had taken approximately 45 hours of accounting. Included in my training were the two auditing courses. I felt that I was prepared to take the big step into public accounting at that very moment, even though I had been warned by all my professors of the big transition necessary between the classroom and practice.

As I soon discovered, the professors were right. In my first two years in public accounting I have discovered three obvious facets of this profession that in my own mind greatly distinguish practice from the classroom. One is the importance of being able to gather the information necessary to analyze the financial statements. Whereas in college you are given this information in connection with a specific problem, in practice you must sort through all the related information to determine what is relevant and what is irrelevant. This ability becomes of greater importance as you advance in the profession and encounter more difficult problems.

A second obvious difference is the increased emphasis in practice on the ability to distinguish between significant and insignificant deviations from accounting principles or procedures. In the classroom you are concerned with exactness in the problems assigned; however, in practice, deviations or misstatements are compared to the financial statements to determine if they are "material" errors. If they are not considered material deviations, the accountant can then render his opinion that the items in the financial statements are reasonably stated.

The third distinguishing feature, and the one I want to discuss in detail tonight, is the accounting profession's heavy emphasis on improving the efficiency of the application of auditing standards. In this area, accountants are continually striving to perfect new audit techniques to facilitate the performance of the work necessary to express an opinion on the financial statements. In recent years there have been many such developments.

TWO MINOR DEVELOPMENTS

A modest development that has become much more widespread in the last five to ten years is the use of audit programs as a guide in performing the audit work. An accountant must leave enough information in the working papers so that someone else with just a superficial knowledge of the job can tell just what work was performed in a given area. To meet this need an audit program outlines in a concise and orderly manner the work performed. In our economy today, businesses are decentralizing into various branches more and more each year. An audit program also allows the originating office of an audit engagement to control the amount of work done in the various offices of a client. For instance, one of our clients, a certain broadcasting corporation, has several divisions scattered throughout the country. Our Atlanta office controls the general areas to be audited by supplying our other participating offices with various audit programs. In addition, the audit programs aid greatly in keeping the division working papers uniform, thus greatly facilitating the consolidation of the financial statements.

Another modest development is increased use of a client's internal reports and of client-prepared working papers for audit purposes. Frequently, a client is large enough to require regular reports and, from time to time, special reports for internal use that the auditor can use to facilitate his examination. Clients who do not have detailed internal reports realize that accountants are too expensive to be hired for clerical duties that could be performed by their own employees. So as a general rule, these clients offer their services in preparing any detail schedules necessary for the audit. This action serves a dual purpose: It saves the client money, of course, and it also ensures that the schedules will be prepared by someone familiar with the financial records. Some examples of client-prepared working papers are property schedules, details of account balances such as receivable or liability accounts, analysis of prepaid expenses. There are many others. This practice eliminates much of the detail work for the CPA.

BASES OF THE AUDITOR'S OPINION

When an accountant expresses an opinion on the reasonableness of financial statements, he has three principal bases of reliance. One basis is what Haskins & Sells calls an "analytic review"; this term refers to the over-all scrutiny of the general ledger accounts in order to investigate, to the auditor's satisfaction, any large fluctuation between months,

or between the current year and the preceding year, and any unusual transactions. A second basis of reliance is the evaluation of the client's system of accounting and internal control. The final basis is the examination of details relating to transactions or account balances. The last two bases—evaluation of internal control and tests of transactions—can be achieved by audit procedures based on statistical sampling applied to the financial records. Necessarily, the examination of transactions occurring during the year must be on a test basis; otherwise, the audit would require so much time and incur so much cost from the client's viewpoint that no one could afford to hire public accountants. In the past, accountants selected certain months or other periods to test the client's transactions; from this small sample they would arrive at a conclusion about the year's transactions. If they were not satisfied that the sample selection would assure them of the reasonableness of the transactions as a whole, then they would extend audit tests by selecting other periods. However, the tests were limited just to portions of the year; transactions for the whole year were not subjected to these tests. Also, there was no way to *measure* the uncertainty inherent in using a sample to draw a conclusion about the entire year.

STATISTICAL SAMPLING PLAN

For the past five years our firm has been using a combination of this block method and a statistical sampling method to apply audit tests. The extent of use of the sampling plan was left to the discretion of the separate offices. However, the firm recently completed a revised Audit Program for Transactions, which provides for the use of statistical sampling to as great an extent as possible. We still use the block method of testing in some areas; however, the majority of the tests employ statistical sampling. We find that by using this new concept in our testing procedures we can measure the uncertainty in an audit sample. Being able to measure the uncertainty allows us to set a limit to the amount of errors we can find in a given area without qualifying our opinion on the financial statements. In our use of statistical sampling we term this uncertainty factor the "monetary precision limit."

The monetary precision limit used in designing a sample should not exceed the minimum aggregate amount of errors that would be considered material in relation to the financial statements. Materiality, of course, is subjective; so in practice the precision limit is generally decided upon before the job is begun. As you have discovered in the class-

room, many bases are used to determine what is material—total assets, sales, net income, etc. The important thing to know is that the decision about the precision limit does not fall in the realm of statistical sampling but is, rather, a subjective opinion before the job begins, based on what the accountant considers to be material in the circumstances.

Materiality is not the only factor considered, though, when deciding upon a precision limit. Some clients expect an auditor to find errors in an account somewhat less than the precision limit. For instance, some clients are more concerned with an error in the cash balance than they are with an error in the inventories. If this is so, we adjust the precision limit downward in this area.

Since materiality is related only to the financial statements being audited and since judgment concerning it is entirely subjective, the precision limit set in designing the sample may be open to further consideration after the sample has been evaluated. Our use of statistical sampling has been based on the premise that no errors will be found in the sample, which means that the entire population would contain errors amounting to, at most, the preliminary precision limit. Therefore, no more work need be done, for we can accept this amount of error. However, if we find any monetary errors in the sample, an evaluation of the effect on the precision limit must be made. This computation results in an adjusted precision limit. Ordinarily, unless there is a significant number of errors, the adjusted precision limit will not differ substantially from the preliminary one. The method of evaluating a sample and steps that may be taken if there is an unacceptable increase in the precision limit will be discussed later.

Another place where subjectivity appears in statistical sampling is in the selection of a "reliability factor." The reliability factor is a judgmental decision on the part of the accountant. He assigns a mathematical value to the client's existing internal control, so that the extent of his audit tests will be dependent upon these control procedures. The reliability factor is designed, however, to take into consideration that there will be a certain amount of monetary errors no matter how good the internal control. The use of the precision limit and the reliability factor together gives us the mathematical assurance that the amount of monetary errors does not exceed a pre-set limit for a given population.

After deciding on the precision limit and the reliability factor for the particular application of statistical sampling, the next concern of the auditor is the efficiency of the sample. "Efficiency" refers to the length

of time necessary to select and examine the sample items. The efficiency is affected by both the population data and the extent and manner of any stratification. For this particular sampling plan it is not necessary to know anything about the population (specific area) to be sampled, although an estimate of the monetary amount of the population items and an estimate of the number of items facilitates the decision about the stratification.

Stratification consists of dividing the population into two or more strata or layers, based on the maximum monetary amount of individual items included in each stratum. The purpose, of course, is to select items of lower amounts at a much smaller rate than the larger items. For example, a three-strata design might contain strata of $10,000 and above, $10,000 to $1,000, and below $1,000. We would expect to examine items of over $10,000 much more frequently than we would items of less than $1,000. The cut-off points for each stratum, the precision limit, and the reliability factor are all used in a formula to determine the sampling intervals for each stratum.

After the precision limit and reliability factors have been decided upon and after the population, the stratification, and the sampling intervals have been determined, we are ready to select the sample items for examination. It is assumed that statistical methods of selection will be used after the sample has been designed. This eliminates the bias and subjectivity encountered in the past when blocks of records were tested (months, for instance). When the choice is made by statistical methods each item in the population for the entire year has an equal mathematical chance of being selected. There are two basic methods of statistical selection.

One method is called "systematic selection," which makes use of counted intervals, terminal digits, fixed positions on a page, or measured intervals. All these techniques have one thing in common: They all make use of a random starting point. This is the attribute that gives each item in the population an equal chance of being selected. Generally, we use the final digits of the serial number of a dollar bill as our starting point, and then select the items for examination, using one of the techniques described previously.

The other method of selection is termed "random selection." This method employs a table of random numbers. As described before, a random starting point is selected for entering the table and the necessary numbers are listed. For the most part, random selection is used

with prenumbered items, with the random numbers serving as terminal digits.

The items selected are compared with the client's accounting records to see that they reasonably reflect the detail transactions for the year. In the comparison, we look for two types of deviations or errors—procedural and monetary. "Procedural" deviations are defined as deviations from any procedures that we regard as essential to sustain our evaluation of the potential effectiveness of the internal control procedures. "Monetary" errors, on the other hand, are defined as any errors that affect the amount of an item shown in the financial statements, schedules, or other material on which we express an opinion. As mentioned previously, we generally do not find errors in our samples. However, when we do find errors, we must use the number of procedural deviations and the amount of monetary errors discovered in order to evaluate their effect.

Basically, this effect is an adjustment of the reliability factor and the monetary precision limit. After the adjusted precision limit is determined, the accountant must decide whether he can live with this amount of monetary error in relation to the financial statements. Unless there is a significant number of errors, the precision limit will not be altered very much. As a rule, the adjusted precision limit can be tolerated without altering our opinion. However, if the new amount cannot be tolerated, then the accountant has two courses of action. He can determine the exact amount of errors by a detail review of the population, or he can adjust the financial statements on the basis of his sample findings. These additional procedures are the exception rather than the rule, though, because of the basic correctness of accounting data. However, we had one "sophisticated" client who adjusted for the overstatement in his inventory on the basis of the errors found in the sample and the related evaluation.

INNOVATIONS IN STATISTICAL SAMPLING

The discussion to this point constitutes, basically, a general description of our use of statistical sampling. Very recently—within the past year—our firm has added two major innovations to our use of statistical sampling. Both are used in order to cut down the amount of detail work necessary, but at the same time to give us the same statistical assurance of measuring the monetary errors. The first is the introduction of a method to use a greater number of strata and

still be able to select our sample with only one pass through the records. Previously it was difficult to use more than four or five strata because each stratum had a different interval, which required several passes. However, the "multiple-strata design" employs one interval along with more strata. For instance, in selecting disbursement vouchers for examination in a recent application of the plan we used 30 strata. The second additional feature introduced is termed "sub-sampling," which allows inspection of a very small proportion of the documentary support for an item selected as part of the sample. For instance, if we selected a voucher for examination with 100 invoices for support, it would be possible under the sub-sampling plan to look at just one invoice and still be mathematically assured of the correctness or incorrectness of the entire voucher.

There are a great many audit areas where we use statistical sampling. I will give a few examples. One audit procedure is the examination of checks for comparison with the check register. Our audit purpose is to satisfy ourselves that the check register properly reflects the actual disbursements of cash and that the internal control procedures in connection with the disbursing of cash are operating as we have evaluated them. The monetary population, of course, is the approximate total of all checks written during the year. The numerical population is the number of checks written. The reliability factor is based on internal control, and the precision limit is based on materiality. The cut-off points, or strata, are determined by formula or by a review of the population. The basis of selection, for the most part, is terminal digits, because the checks are generally prenumbered. For instance, we might select all checks ending in 61 and 89. Any errors found in comparing the checks to the check register would be evaluated.

A second use of statistical sampling is the selection for confirmation of accounts receivable. The monetary population is the total amount of accounts receivable, while the numerical population is the number of accounts. We apply the sample design and mail out confirmations on the accounts selected. Monetary and procedural deviations would be discovered upon the return of the confirmations by the customers. If each account had several open invoices, we could use sub-sampling and select one or more (depending upon a formula) invoices for confirmation purposes. This feature becomes especially important when the client's customers fail to confirm the total balances

because their records are kept on an open-invoice basis. Confirmation of individual invoices using sub-sampling gives us the same mathematical assurance that the accounts are stated reasonably as confirmation of the entire account balance would have given.

Other areas in which we use statistical sampling are in the examination of vouchers and related support, in the examination of sales invoices, in tests of cash receipts records, in tests of payrolls, in the examination of inventories, in the detection of unrecorded liabilities, etc. Seemingly there is no end to the uses of this mathematical tool. It is entirely up to the ingenuity of the accountant on the job.

"AUDITAPE SYSTEM"

In addition to statistical sampling, the use of computer audit programs is another revolutionary breakthrough that our firm has developed. We call it the "Auditape System." This system has become necessary because of the emphasis by the business economy in the past few years on bigger and better computers. Accountants have been able in the past to "work around" the data processing system without having to worry about this intermediate step between the initial and final records. Most clients get detail print-outs of the important information; this is where we applied our tests and compared the initial records to the detail print-outs, by-passing the data processing steps.

However, in the last couple of years, computers employing a greater storage capacity have been introduced. Business firms have found it practical to store large volumes of the transaction details inside the computer and to process the necessary information by utilizing computer programs. As the use of computers becomes more widespread, it becomes necessary to be able to work "through" the machine rather than "around" it. This is where the Auditape System comes into the picture.

Again, before we select any items for examination, we review the internal control surrounding the computer—the controls over the input information, the controls over the processing of the information, and the controls over the output data. We evaluate the internal control to get our reliability factor and decide upon a precision limit. These are employed in the audit program, which contains our statistical sampling plan. Then we are ready to use the Auditape System.

This system has several program routines designed according to a building-block concept; in other words, routines can be linked to-

gether in any sequence to perform a variety of audit functions. The initial routine is the Edit Routine, which converts the client's records into a format that can be used by the Auditape System. At the same time, the footings can be checked for accuracy, for this routine accumulates the total of each record edited.

The second routine—the Audit Sample Routine—is the backbone of the system. Generally, for transactions of any volume it takes a couple of hours to select a sample if it is done manually. However, employing the Auditape Sample Routine, it will take but a matter of minutes. For instance, in one of the first demonstrations of this system, in a matter of 15 minutes a battery of electronic data processing equipment selected a sample of 233 significant vouchers from a client's record of 25,388 entries. Other routines are summarizing, computing, printing, and evaluating the sample. The final result is generally a print-out of the sample, which is subjected to the scrutiny and judgment of the accountant. Any errors are used by the machine to evaluate the sample. The Auditape System can be used for any audit purposes that statistical sampling can be used for—for instance, examination of vouchers or receivable confirmation. However, the speed of the selection will greatly enhance any audit.

An important by-product of the Auditape System is its potential in making special studies for the client. Some of our clients have indicated an interest in the Auditape System for internal auditing purposes as well as for the preparation of special reports. Of course, this system is just a beginning. It will be developed as the accounting processes are developed. At the present stage, however, we feel that this computer audit program is a breakthrough in auditing financial statements and will greatly facilitate our procedures.

STATISTICAL TECHNIQUES FOR AUDIT REVIEW

A third audit technique that has been introduced for discussion and review in our firm in the last couple of months is called Statistical Techniques for Analytic Review, or STAR. In the past the analytic review, which complements the tests of the yearly transactions, has been, for the most part, entirely subjective. In order to isolate unusual transactions for fluctuations for detail examination, the auditor compares the fluctuations of functionally related accounts, compares the actual with budgeted amounts, compares account balances from one year with the next, or compares account balances from month to month. Any

fluctuation would be followed up until the accountant had a reasonable explanation for this deviation. Difficulty arises, however, in determining just what is a significant fluctuation. Also, the variation might be caused by seasonal fluctuations or by economic changes. An analytic review can tax an accountant's judgment.

STAR is an attempt to bring the analytic review to objective rather than to subjective terms. Basically, the accountant must decide which of the general ledger accounts are functionally related—that is, which accounts are directly affected by the variations or fluctuations in another account. For instance, sales and cost of sales are in most cases functionally related; that is, an increase in one would generally reveal an increase in the other, although not necessarily proportionately. After the related accounts are decided upon, a graph might be used to show the correlation between the two accounts. A line of best fit would indicate any unusual fluctuations from the norm. These deviations would be examined more closely to determine the reasons for them.

One reason for suggesting the use of statistical techniques for analytic review is that this will help to explain the variability of accounting data and increase our understanding of the functional relationships that should exist between certain combinations of accounts. Also, using this concept, it should be possible to make the analytic review an objective audit procedure rather than a subjective one.

CONCLUSION

Necessarily, the discussion of new audit techniques—audit programs, client-prepared working papers, statistical sampling, Auditape System, and statistical techniques for analytic review—has been brief because of the time limit. The development of these techniques represents only one link in a long chain the accounting profession is continually striving to forge.